**White Paper**
**Summary of Oregon's Temperature Standards**
Nevada Division of Environmental Protection
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## *Introduction*

The first water temperature criteria for Oregon were adopted in 1967 for the Willamette River. In 1979, the Environmental Quality Commission adopted statewide criteria by basin.[1] These standards were not changed between 1979 and the early 1990s.

In 1992, the Oregon Department of Environmental Quality (ODEQ) initiated a comprehensive review of Oregon water quality standards, including temperature. To assist in the water quality standards review, ODEQ established a Policy Advisory Committee and a Technical Advisory Committee. The Technical Advisory Committee chose not to follow the procedures to determine criteria detailed in the Quality Criteria for Water 1986, commonly known as the Gold Book. Instead the Technical Advisory Committee reviewed more than 500 scientific publications on the effects of temperature on aquatic organisms, and evaluated whether the existing standards were consistent with the scientific literature. In 1995, the Policy Advisory Committee and the Technical Advisory Committee prepared a final issue paper that made the following recommendations to ODEQ and the Environmental Quality Commission concerning the water temperature standards that were based on the temperature requirements of salmonids, which vary by salmonid life stage and corresponding season:

- 17.8 ºC for juvenile salmonid rearing (summer maximum).
- 12.8 ºC for salmonid spawning, egg incubation, and fry emergence (fall, winter, spring).
- 10 ºC for native Oregon bull trout, *Salvelinus confluentus* (summer maximum).
- 20 ºC for the Columbia River below mile 309 and for the Willamette River below mile 50.

The Environmental Quality Commission adopted changes to Oregon's water quality standards, including temperature, as administrative rules on January 11, 1996. EPA, the National Marine Fisheries Service, and the US Fish and Wildlife Service reviewed the standards proposed by ODEQ and found several areas where they felt salmonids and other beneficial uses would not be adequately protected. EPA approved in part and disapproved in part the Oregon temperature criteria in July 1999. Rather than promulgating new temperature criteria based on the disapproval, EPA instead focused its energy an interagency regional review of temperature standards appropriate to protect salmonids in the Pacific Northwest that resulted in the EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards dated April 2003. Revised standards were adopted by the Environmental Quality Commission on December 4, 2003 and EPA approved most of the revisions on March 2, 2004 (see Table 1). EPA disapproved ODEQ's narrative criteria for cool water species, natural lakes, and oceans and bays. ODEQ revised the standards in February 2007 and EPA approved the revised narrative criteria in February 2011. The resulting water quality standards are consistent with the EPA Region 10 Guidance. The following sections discuss these criteria and other provisions in more detail.

[1] In the 1979 standards, both maximum stream temperatures allowed and the allowable increases in temperature varied among Oregon's river basins. Many basins west of the Cascades had a criterion of 14.4 ºC. Many streams in eastern Oregon had a criterion of 20 ºC.

**Table 1. Oregon's Current Temperature Criteria**

| Beneficial Use | 7DADM[1] (° C) | When Criterion Applies[2] |
|---|---|---|
| Salmon and Steelhead Spawning, Egg Incubation, and Fry Emergence | 13 | Spawning Dates[3] |
| Core Cold Water[4] | 16 | Year round |
| Salmon and Trout Rearing and Migration[5] | 18 | Year round |
| Migration Corridor[6] | 20 | Year round |
| Lahontan Cutthroat Trout or Redband Trout | 20 | Year round |
| Bull Trout Spawning and Juvenile Rearing | 12 | Year round |

[1] 7DADM is the "seven-day-average maximum temperature."
[2] The State has specified both times and locations where the standards apply on maps and in tables.
[3] Spawning use dates means the dates specified on the "Salmon & Steelhead Spawning Use Designations" maps in OAR 340-041. Because there is no criterion for resident trout spawning, dates for this use have not been specified.
[4] "Core Cold Water Habitat Use" means waters that are expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer.
[5] "Salmon and Trout Rearing and Migration Use" means thermally suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout.
[6] "Migration Corridors" mean those waters that are predominantly used for salmon and steelhead migration during the summer and have little or no anadromous salmonid rearing in the months of July and August.

## *Salmon and Steelhead Spawning, Egg incubation, and Fry Emergence Criteria*

In early 2003, EPA Region 10 recommended a criterion of 13 °C 7DADM for the protection of salmon/trout spawning, egg incubation, and fry emergence based on a review of available information. On December 4, 2003, the Environmental Quality Commission adopted a Salmon and Steelhead Spawning criterion of 13 °C (7DADM). Salmon and Steelhead Spawning Use means waters that are or could be used for salmon and steelhead spawning, egg incubation, and fry emergence. The Salmonid Spawning criterion is applicable at the locations and during the dates specified on the "Salmon & Steelhead Spawning Use Designations" maps in OAR 340-041. Because there is no criterion for resident trout spawning, dates for this use have not been specified. This replaced the 1996 criteria of 12.8 ºC for salmonid spawning, egg incubation, and fry emergence (fall, winter, spring).

## *Core Cold Water Criteria*

In early 2003, EPA Region 10 recommended a criterion of 16 °C 7DADM for the protection of salmon/trout "core" juvenile rearing based on a review of available information. On December 4, 2003, the Environmental Quality Commission adopted a Core Cold Water criterion of 16 °C (7DADM). Core Cold Water Habitat Use means waters that are expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer. There wasn't a criteria adopted in 1996 to specifically protect Core Cold Water.

### *Salmon and Trout Rearing and Migration Criteria*

In early 2003, EPA Region 10 recommended a criterion of 16 °C 7DADM for the protection of salmon/trout "core" juvenile rearing based on a review of available information. Salmon adult holding prior to spawning, and adult and sub-adult bull trout foraging and migration may also be included in this use category. At this time, EPA Region 10 also recommended a criterion of 18 °C 7DADM for the protection of salmon/trout migration plus non-core juvenile rearing. On December 4, 2003, the Environmental Quality Commission adopted a Salmon and Tout Rearing and Migration criterion of 18 °C (7DADM). Salmon and Trout Rearing and Migration Use means thermally suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout. This replaced the 1996 criteria of 17.8 ºC for juvenile salmonid rearing (summer maximum).

### *Migration Corridor Criteria*

In early 2003, EPA Region 10 recommended a criterion of 20 °C 7DADM for the protection of salmon/trout migration based on a review of available information. In addition, there is a provision to protect and, where feasible restore the natural thermal regime. On December 4, 2003, the Environmental Quality Commission adopted a Migration Corridor criterion of 20 °C (7DADM). Migration Corridors mean those waters that are predominantly used for salmon and steelhead migration during the summer and have little or no anadromous salmonid rearing in the months of July and August. There wasn't a criteria adopted in 1996 to specifically protect migration corridors.

### *Lahontan Cutthroat Trout and Redband Trout Criteria*

Oregon's Lahontan cutthroat trout criterion is based on recommendations in Dr. Jason Dunham's 1999 report *Stream temperature criteria for Oregon's Lahontan cutthroat trout Oncorhynchus clarki henshawi*. Dr. Dunham recommended a numeric criterion for Lahontan cutthroat trout of 20 ºC as a 7-day-average daily maximum because a 7-day-average daily maximum of 20 ºC would present a very low possibility of exceeding 22.2 ºC on the warmest day of the 7-day period. He concluded that this criterion would protect Lahontan cutthroat trout from both acute and chronic impacts and noted that this value includes a 2 ºC margin of safety as recommended by EPA temperature guidance at the time.

Dr. A Kurt Gamperl and Dr. Ken Rodnicks' 2003 report *Metabolic and thermal physiology of eastern Oregon redband trout: Recommendations for appropriate numeric temperature criteria* recommended a numeric criterion for redband trout of 22 ºC as a 7-day-average daily maximum based on their literature review. The State of Oregon decided to adopt a lower criterion of 20 ºC as a 7-day-average daily maximum.

For the purposes of applying temperature criteria, Lahontan cutthroat trout and redband trout were combined into one "guild."

### *Bull Trout Criteria*

In early 2003, EPA Region 10 recommended a criterion of 12 °C 7DADM for the protection of bull trout juvenile rearing based on a review of available information. In addition, EPA recommended a criterion of 9 °C 7DADM for the protection of bull trout spawning. In response, ODEQ proposed a numeric criterion

of 12 °C 7DADM in the fall of 2003 to protect bull trout spawning and juvenile rearing. It is expected that where the 12.0 °C criterion is met during the warmest week of the year, the condition of the stream is such that the natural thermal regime and appropriate spawning and incubation temperatures are protected as well (i.e., if 12 ºC is met as a 7DADM that temperatures should not exceed 9 ºC during spawning season). Because this assumption would not necessarily hold true for spawning areas below reservoirs, a narrative has been added to the rule that prohibits more than a de minimis warming from above to below the reservoir during spawning and egg incubation times. The narrative criteria applies from August 15 to May 15. Revised temperature criteria to protect bull trout were adopted by the Environmental Quality Commission on December 4, 2003 and EPA approved most of the revisions on March 2, 2004.

Bull trout are also protected by the Core Cold Water criteria of 16 °C (7DADM). Cold Water Habitat Use means waters that are expected to maintain temperatures within the range that are suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer.

### *Cool Water Species Criterion*

Oregon's standards include a narrative criterion for Cool Water Species: "No increase in temperature is allowed that would reasonably be expected to impair cool water species." The Cool Water Species narrative applies year round.

### *Natural Conditions Criterion*

Oregon's standards include a narrative criterion for Natural Conditions: "Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body." The Natural Condition narrative applies year round.

### *Lack of Warm Water Species Criterion*

Nearly all the native Oregon fish species are classified as cold- or cool-water species. The only known warm water species that is native to Oregon is the Borax Lake chub. Its habitat is associated with warm water springs and lakes in the arid south central part of the State. Oregon's standards include a criterion to ensure that the Borax Lake chub, a federally listed endangered species, is protected from human caused alteration of its thermal environment. Other warm water species present in Oregon have been introduced including: Cyprinids (goldfish, carp, fathead minnows); Centrarchids (Bluegill, Crappie, Large-mouth Bass); and Catfish. The introduced warm water species now perpetuate themselves in some basins. These introduced warm water species now compete with the native species for habitat and food, and warm streams will favor the non-native species over the salmonids. Therefore, ODEQ did not set water quality standards for warm-water fisheries.

## *Conclusions*

Oregon may not be a great overall model for Nevada to use as a template because Oregon did not set water quality standards for warm-water fisheries and its standards are largely driven by anadromous fish. However, certain portions of Oregon's standards should be very helpful in developing Nevada's temperature criteria such as:

- Oregon's criterion for Lahontan Cutthroat Trout and Redband Trout;
- Oregon's criteria for Bull Trout;
- Oregon's Cool Water Species narrative criterion; and
- Oregon's Natural Conditions narrative criterion.